

**REMARKS**

As a preliminary matter, Applicant's representative again would like to thank Examiner Alexander O. Williams for courtesies extended in the telephonic interview conducted on March 21, 2006, in which Examiner Williams kindly agreed to issue the present non-final Office Action, which reset the time period for reply, in order to provide Applicant with the opportunity to amend the claims in accordance with the personal interview which was previously conducted on December 14, 2005.

Claims 1-3 and 7-24 are all the claims presently pending in the application.

**Claims 11-21 and 23** are **allowed** and **claims 2, 7-10, and 22** would be **allowable** if rewritten in independent form. However, Applicant submits that all of the pending claims (i.e., claims 1-24) are patentable over the prior art of record, for at least the following reasons.

While Applicant believes that all of the claims are patentable over the prior art of record, to speed prosecution, independent claim 1 is amended to define more clearly and particularly the features of the present invention.

New claim 24 is added to provide more varied protection for the present invention.

No new matter is added.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1 and 3 are the only claims rejected on prior art grounds.

Particularly, claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomoto (U.S. Patent No. 6,320,216 B1).

This rejection is respectfully traversed in the following discussion.

## **I. THE CLAIMED INVENTION**

In the conventional devices the contact resistivity of the electrode generally is high and it generally is impossible to obtain an ohmic junction when metal is formed simply on the semiconductor surface.

The claimed invention, on the other hand, solves the problems with the conventional devices by addressing the substance of the compound semiconductor/metal boundary and the relation with the metal boundary structure.

For example, in an exemplary aspect of the claimed invention, as defined for example, by independent claim 1, an electrode for a p-type Group III nitride compound semiconductor layer, including a film including polycrystalline metal disposed on said Group III nitride compound semiconductor layer, wherein the polycrystalline metal includes a transition metal.

Thus, the claimed invention provides an electrode having a lower contact resistance to p-type group III nitride compound semiconductor than conventional electrodes. Moreover, the electrical characteristics of the electrode according to the claimed invention are improved greatly (e.g., see Abstract).

The claimed invention also reduces the height of the Schottky barrier between the compound semiconductor and the metal by the strong orientation force of the metal, such that the value of contact resistance in the boundary between the p-type Group III nitride compound semiconductor and the metal can be reduced greatly (e.g., see specification at page 6, lines 12-18).

## II. THE PRIOR ART REJECTION

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nomoto.

In the present Office action, the Examiner alleges that Nomoto teaches all of the features of the claimed invention (see Office Action at pages 3-6).

Applicants respectfully submit, however, that there are elements of the claimed invention which clearly are not disclosed or suggested by Nomoto. Therefore, Applicants traverse this rejection.

In the present Office Action, the Examiner alleges that Figures 1 and 11B of Nomoto show an electrode 7, 4d, 6, 4c, 5b, 5b, 5a, for a p-type Group III nitride compound semiconductor layer 4a, including a film at least containing polycrystalline metal 6, wherein the polycrystalline metal includes a transition metal 5b, 5a (citing Nomoto at column 10, lines 27-37).

Applicant submits that Nomoto does not disclose or suggest all of the features of independent claim 1, or dependent claim 3.

For example, as the Examiner pointed out in the personal interview conducted on December 14, 2005 and in the present Office Action, Nomoto discloses “transition layers 5a and 5b may be made of metal such as Ti or Nb respectively” (see Nomoto at column 10, lines 36-37).

However, Applicant submits that, when read in the context of the entire sentence, column 10, lines 34-37, of Nomoto discloses:

Furthermore, the barrier layers 4a, 4b, 4c, and 4d may be made of an insulator such as TiOx or NbOx, and the transition layers 5a and 5b may be made of metal such as Ti or Nb respectively.

That is, Nomoto inserts an insulator between the conduction layer (or substrate) and the transition layer. Such structure also is clearly shown in Figures 11A and 11B of Nomoto (i.e., conduction layer or substrate 1 / insulator 4a / transition layer 5a).

On the other hand, as shown in Figure 6 of the present application, the claimed invention provides the film, which includes a polycrystalline metal including a transition metal, on the Group III nitride compound semiconductor layer without inserting the insulator therebetween.

Further, the transition metal of the claimed invention is directly disposed on (or, is in contact with) the Group III nitride compound semiconductor layer.

Turning to the claims, independent claim 1 recites an electrode for a p-type Group III nitride compound semiconductor layer, including:

*a film including a polycrystalline metal disposed on said  
Group III nitride compound semiconductor layer,  
wherein said polycrystalline metal comprises a transition  
metal (emphasis added).*

Applicant submits that Nomoto clearly does not disclose or suggest at least “*a film including a polycrystalline metal disposed on said Group III nitride compound semiconductor layer*”, as recited in claim 1.

For the foregoing reasons, independent claim 1 clearly is patentable over Nomoto. Moreover, dependent claim 3 also is patentable over Nomoto by virtue of its dependency from claim 1, as well as for the additional features recited therein.

The Examiner is requested to reconsider and withdraw the rejection of claims 1 and 3, and to permit claims 1 and 3 to pass to immediate allowance.

### III. NEW CLAIM

New claim 24 is added to provide more varied protection for the present invention.

No new matter is added.

Applicant submits that Nomoto does not disclose or suggest all of the features of claim 24.

As exemplarily illustrated in Figure 6 of the present application, the claimed invention provides the film, which includes a polycrystalline metal including a transition metal, on the Group III nitride compound semiconductor layer without inserting the insulator therebetween.

Further, the transition metal of the claimed invention is directly disposed on (or, is in contact with) the Group III nitride compound semiconductor layer.

Turning to the claims, dependent claim 24 recites, *inter alia*, that the “*film is disposed directly on said p-type Group III nitride compound semiconductor layer*” (emphasis added).

Applicant submits that Nomoto clearly does not disclose or suggest at least that the “*film is disposed directly on said p-type Group III nitride compound semiconductor layer*”, as recited in claim 24.

For the foregoing reasons, claim 24 is patentable over Nomoto by virtue of their dependency from claim 1, as well as for the additional features recited therein.

The Examiner is requested to permit claim 24 to pass to immediate allowance.

### IV. CONCLUSION

In view of the foregoing, Applicant submits that claims 1-3 and 7-24, all the claims presently pending in the application, are patentably distinct over the prior art of record and


are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

No fees are believed to be necessary. However, the Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

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